

NASA HDTV Transition Plan

Overview

As the television broadcast industry changes from analog to Digital Television (DTV) and High Definition Television (HDTV) in particular, NASA will change its video systems to be compatible with the broadcast industry. This change will enable NASA to continue to provide the media with information about NASA programs which the media will then disseminate to the public. Making this change will allow NASA to continue to fulfill its statutory mission to provide for the widest practicable dissemination of information concerning its activities. In addition, DTV and HDTV show great promise as a tool to enhance NASA's Research & Development (R&D) activities.

During the early stages of the broadcast industry's transition to digital television, it will not be necessary for NASA to convert the entire NASA television infrastructure to digital to accommodate the media's requirements for video. Rather, a three tier approach to accomplish the transition gradually could be adopted.

The first tier involves the development of a system that would travel, as needed, to support launches and events at NASA centers. The travelling system could either be in shipping cases or configured as a mobile unit.

The second tier addresses the development of a fixed system capability at each of the NASA centers. The system capability for these centers would be similar to the travelling system, with slight differences based on a Center's primary NASA mission. This fixed system would provide an acquisition, post-production, as well as live and tape distribution capability. It is not intended to replace the entire capability a NASA center has today, or replace the basic television infrastructure.

The complete replacement of a center's analog television infrastructure will be the third tier. This has been planned to occur as most of the broadcast industry is transitioning to digital plants.

First-Tier HDTV Capability

The capabilities of the first-tier travelling HDTV system are:

- Field Acquisition
- Post-Production of Field Material
- Upconversion of Archive Material

- Live-Shot Capability
- Switched Studio Live Production with Titling
- Real-Time Release
- Tape release

The minimum system that can support these capabilities for the traveling system have been defined as having these major components:

Qty	Description
3	HD Camcorders w/studio pack
3	Camera Control Units
3	Camera Support
2	16 X 9 30" Monitors
10	16X 9 8" Preview Monitors
3	16X 9 20" Engineering Monitor
1	Audio Monitoring System
1	Digital Audio Console
1 Set	HD Audio & Video Distribution Amplifiers
3	HD VTR
1	HD Non-Linear Editor
1	HD Production Switcher
1	HD Character Generator
1	HD Sync & Test Signal Generator
1	HD Waveform/Vectorscope
1	16 X 16 HD Router
1	ATSC Encoder
1	NTSC - HD Upconverter
1	HD Test Set
1	Intercom System
1 Set	Consoles & Rack Cabinet

- **Travelling System:** The travelling system will allow a center to perform HD acquisition, live production, post-production, and real-time and tape distribution. This system will be able to be transported as required to a center.

Second-Tier HDTV Capabilities

Permanent HDTV systems will be installed at the NASA centers as the broadcast industry transition accelerates. The exceptions to the basic fixed system are as follows:

- **Kennedy Space Center (KSC):** Systems for KSC will include the capability to cover launches, landings and related activities with a limited number of HDTV cameras, as compared to the current number of PAO cameras that are part of the Orbiter Television (OTV) system. However, experience gained supporting the HDTV coverage of STS-95 indicates fewer cameras are required. Sufficient production equipment will be in place to produce HDTV products equivalent to what is supplied now to the media and used on NASA-TV. The system will allow live feeds to the media and NASA-TV, and tape distribution. Additionally, 17 cameras, 14 fixed and 3 camcorders will be needed for Public Affairs Office (PAO) coverage and to report on launch pad activities. 12 of the fixed cameras will require remote pan/tilt/zoom capability. Also an additional 7 encoders and 27 VTR recorders will be needed. The VTRs will handle isolated recording of cameras for post-launch analysis, editing, and dubbing requirements. Routing and monitoring would have to be expanded to handle the number of cameras and VTRs.
- **Johnson Space Center (JSC):** The JSC system will have the capability to cover both ISS and SSP mission activities. This includes producing feeds from either mission control room concurrently, recording HD downlink signals, producing animations and other mission related video products, and providing the same signal distribution as KSC. To cover mission and PAO requirements, an additional 7 fixed cameras, 4 with remote pan/tilt/zoom capability, will be needed. 12 more VTRs would be needed to handle downlink video, editing and dubbing requirements. This would necessitate enhanced routing capability.
- **NASA Headquarters (NASA-HQs):** HDTV plans for NASA-HQ include systems for live event coverage as well as production. The HQ system will be able to cover press briefings and other live events as is done now and produce NASA related video products for release. The HQ system will also have distribution capability to NASA-TV, the media, and through tape release. Above the basic system, NASA-HQ will need two additional fixed cameras, four VTRs, and one encoder.
- **Marshall Space Flight Center (MSFC):** The MSFC system will be similar to JSC, but will not have a concurrent ISS/SSP coverage requirement. The system will have the capability to cover ISS science activities, including recording downlink signals, production for mission related video products, and distribution to the media and NASA TV. MSFC will need the same

camera complement as JSC, but not the same recorder capability. 7 additional VTRs should handle MSFC requirements, along with expanded routing and monitoring.

- **Ames Research Center** (ARC) has some capability now, but plans some changes to the basic package to accommodate center specific requirements and facilities modifications.
- **Goddard Space Flight Center** (GSFC), in addition to the initial system, will include three additional encoders and test equipment to support NASA Television distribution.
- **Langley Research Center** (LaRC) currently has a resolution independent editing/compositing system and does not need the non-linear editor portion of the initial system. In addition, other parts of the existing system at LaRC are planned to be used to support the initial system.
- **Dryden Flight Research Center** (DFRC), **Glenn Research Center** (GRC), the **Jet Propulsion Laboratory** (JPL) and **Stennis Space Center** (SSC) have no current capability. The full initial system capability will be installed at these four installations. In addition, facility modifications will be made at SSC to accommodate the installation of the initial system.

Third-Tier HDTV Capabilities

As aging equipment begins to fail, it will be necessary to replace the other portions of each center's video infrastructure. This includes adding sufficient systems to handle the entire production, duplication, and distribution requirements of a center. This will include on-site cable TV systems, dedicated video circuits for production grade feeds, and a myriad of video systems used for program support at each center.